Biomedical Sciences

Biomedical Sciences

Program Director: Fred 'Ted' Bertrand, PhD

The B.S. in Biomedical Sciences program curriculum is designed to prepare students for entry into the biomedical science workforce or for graduate and professional study in the health professions. Many of the prerequisites for admission to identified graduate programs can be incorporated into the student's program of study. This allows students to create a tailored undergraduate educational experience to prepare for further study in an area of choice such as physician assistant studies, medicine, dentistry, optometry, physical therapy, biotechnology, clinical laboratory science, genetic counseling, and many more. A practicum is not required in the BMD curriculum but if a student chooses to complete a practicum a Background Check and Drug Screening will be required.

Admission Requirements

Students intending to enroll in the B.S. in Biomedical Sciences program must meet all UAB undergraduate admission and academic requirements. The following additional requirements also apply and must be met prior to acceptance into the Biomedical Sciences program.

Program Admission from High School

- Must be a graduate of an accredited high school with a grade point average of a 2.75 or higher on a 4.0 scale for admission.
- Must have earned an ACT Composite Score of 22 (or SAT equivalent) or higher.
- BMD may accept test optional per UAB Admissions guidance. Please contact UAB Admissions for most current test optional guidance.
- Must place in College English 101 or higher.

Program Admission from Community College or University, including UAB, and Degree-Seeking Post-Baccalaureate

- Must meet all UAB undergraduate admission and academic requirements.
- If accepted, complete the UAB Student Health and Wellness Immunization Form and provide proof of medical coverage.
- Must place in College EH 101 or higher.
- Must hold a 2.75 or higher Overall GPA on a 4.0 scale for admission to the Biomedical Sciences Program.

Other Biomedical Sciences Program Requirements

- Grades of C or better are required for any Biomedical Sciences curriculum requirements, including core courses, prerequisites, and corequisite courses.
- A minimum of 2.75 Overall GPA and 2.00 UAB institutional GPA must be maintained to remain enrolled in the B.S. in Biomedical Sciences program.
- A background check and drug screening may be required prior to any practicum or lab placement.

Application Procedure

Applicants are accepted at any time, and students may be enrolled during any term. Applicants can apply online at https://www.uab.edu/admissions/apply.

Contact Information

Email: B (bmd@uab.edu)MD@uab.edu (bmd@uab.edu)
Web address: uab.edu/bmd

The Biomedical Sciences (BMD) program partners with several graduate programs to provide students with enhanced opportunities to prepare for graduate professional education.

B.S. in Biomedical Sciences to M.S. Degree in Medical Laboratory Science Fast Track

Qualified BMD juniors must have an overall minimum GPA of 3.0, a minimum grade of C or higher on all coursework, and a demonstrated interest in Medical Laboratory Science. Students are required to complete the internal BMD to MLS Fast Track application. In consultation with the MLS program manager and BMD advisor, BMD students admitted to the Medical Laboratory Science Fast Track will take selected graduate level courses to meet BMD degree and/or elective requirements. For more information, contact BMD@uab.edu (bmd@uab.edu). Background Check and Drug Screening required.

B.S. in Biomedical Sciences to M.S. Degree in Biotechnology Fast Track

Qualified BMD juniors must have an overall minimum GPA of 3.0 and a demonstrated interest in Biotechnology. In consultation with the BT program manager and the BMD advisor, BMD students who are admitted to the Biotechnology Fast Track will take a total of 6 credit hours of BT courses to fulfill BMD degree or elective requirements: BT 650, BT 651, BT 652, and BT 676 (1 credit hour, taken over 3 semesters). For more information, contact BMD@uab.edu (bmd@uab.edu). Background Check and Drug Screening required.

B.S. in Biomedical Sciences to M.S. Degree in Health Physics Fast Track

Qualified BMD juniors must have an overall minimum GPA of 3.0 and a demonstrated interest in Health Physics. In consultation with the Health Physics program manager and BMD advisor, BMD students admitted to the Health Physics Fast Track will take selected graduate level courses to meet BMD degree or elective requirements. For more information, contact BMD@uab.edu (bmd@uab.edu). Background Check and Drug Screening required.

Early Acceptance Program with PharmD Degree at the Lake Erie College of Osteopathic Medicine

This opportunity is available for BMD majors prior to their third year of study, who are interested in obtaining a doctorate in Pharmacy after graduation. Students who qualify for admission into both the BMD program and the LECOM EAP program and maintain qualifying EAP LECOM credentials until completion of the BMD program will be admitted

into LECOM PharmD program. Contact the BMD program director at BMD@uab.edu for more information.

Bachelor of Science with a Major in Biomedical Sciences

Requirements		Hours
Blazer Core Curriculum		**41**
First Year Experience		
HRP 101	Experience the University Transition [1]	
Chemistry Requirements		
CH 115	General Chemistry I	3
or CH 125	General Chemistry I HONORS	
CH 116	General Chemistry I Laboratory	1
or CH 126	General Chemistry I HONORS Laboratory	
CH 117	General Chemistry II	3
or CH 127	General Chemistry II HONORS	
CH 118	General Chemistry II Laboratory	1
or CH 128	General Chemistry II HONORS Laboratory	
CH 235	Organic Chemistry I	3
or CH 245	Organic Chemistry I Honors	
CH 235R	Organic Chemistry I Recitation	0
or CH 245R	Organic Chemistry I Honors Recitation	
CH 236	Organic Chemistry I Laboratory	1
or CH 246	Organic Chemistry I Laboratory (Honors)	
CH 237	Organic Chemistry II	3
or CH 247	Organic Chemistry II Honors	
CH 237R	Organic Chemistry II Recitation	0
or CH 247R	Organic Chemistry II Honors Recitation	
CH 238	Organic Chemistry II Laboratory	1
or CH 248	Organic Chemistry II Laboratory (Honors)	
Nutrition Requirement		**3**
NTR 222	Nutrition and Health	
Statistics Requirement		**3**
BUS 214	Introduction to Business Statistics	
HCM 360	Statistics for Managers	
MA 180	Introduction to Statistics	
PUH 250	Biostatistics	
PUH 251	Biostatistics Honors	
QM 214	Introduction to Business Statistics	
Biomedical Science Requirements		
BMD 203	Contemporary Issues and the Literature in Biomedical Sciences	3
BMD 310	Clinical Anatomy and Histology	4
BMD 315	Clinical Physiology and Pharmacology for Health Professions I	4
BMD 317	Clinical Physiology and Pharmacology for Health Professions II	4
BMD 320	Survey of Cell Biology for Health Professions	3
BMD 330	Clinical Microbiology for Health Professions	3
BMD 380	Research Methods and Scientific Literacy for the Biomedical Sciences	3
BMD 410	Clinical Biochemistry for Health Professions	3
BMD 420	Pathophysiology for Health Professions	4
BMD 430	Clinical Immunology for Health Professions	3
BMD 440	Human Genetics for Health Professions	3
Electives [2]		**21**
Total Hours		**121**

1. Or equivalent, University approved FYE course.
2. Students may take 200-level or higher courses not already in the curriculum to fulfill elective hours. Students should work with their advisors to choose electives that align with their future educational and professional goals.
3. Students must graduate with a minimum of 121 semester hours.

Example Program of Study for a Major in Biomedical Sciences

The following is a sample four year plan. Plans may vary based on the following: AP/IB credit, dual enrollment credit, transfer courses, test scores, etc. Students are required to work with their BMD academic advisors to develop a plan that aligns with their educational history and goals.

Freshman

First Term	Hours	Second Term	Hours
Academic Foundations: Writing	3	Academic Foundations: Writing	3
Academic Foundations: Quantitative Literacy[1]	3	Thinking Broadly: Scientific Inquiry[3]	4
Thinking Broadly: Scientific Inquiry[2]	4	Thinking Broadly: Humans & their Societies	3
Local Beginnings: HRP 101	3	BY 123 & 123L	4
	13		**14**

Sophomore

First Term	Hours	Second Term	Hours
Academic Foundations: Reasoning	3	CH 237 & 237R & CH 238[5]	4
Academic Foundations: Communicating in the Modern World	3	City as a Classroom	3
CH 235 & 235R & CH 236[4]	4	BMD 203	3
BY 124 & 124L	4	BMD 310	4
Elective	3	Elective	3
	17		**17**

Junior

First Term	Hours	Second Term	Hours
Thinking Broadly: History & Meaning	3	Statistics[7]	3
Thinking Broadly: Creative Arts	3	BMD 317	4
BMD 315	4	NTR 222	3
BMD 320	3	Thinking Broadly[8]	3
Elective[6]	3	Elective[9]	3
	16		**16**

Senior

First Term	Hours	Second Term	Hours
BMD 330	3	BMD 420	4
BMD 380	3	BMD 430	3
BMD 410	3	BMD 440	3
Elective	3	Elective	3
Elective	3		
	15		**13**

Total credit hours: 121

1 MA 106 or higher
2 CH 115, CH 115R, and CH 116 (General Chemistry I) or CH 125, CH 125R, and CH 126 (General Chemistry I Honors)
3 CH 117, CH 117R, and CH 118 (General Chemistry II) or CH 127, CH 127R, and CH 128 (General Chemistry II Honors)
4 CH 245, CH 245R, and CH 246 (Organic Chemistry I Honors)
5 CH 247, CH 247R, and CH 248 (Organic Chemistry II Honors)
6 Example: PH 201, PH 201R, and PH 201L
7 BUS 214, HCM 360, MA 180, PUH 250, PUH 251, or QM 214
8 Select from History & Meaning, Creative Arts or Humans & their Societies (sequence)
9 Example: PH 202, PH 202R, and PH 202L

Proposed Program of Study for a Bachelor of Science in Biomedical Sciences with a Minor in Biotechnology

Freshman

First Term	Hours	Second Term	Hours
Academic Foundations: Writing	3	Academic Foundations: Writing	3
Academic Foundations: Quantitative Literacy[1]	3	BY 123 & 123L	4
Thinking Broadly: Scientific Inquiry[2]	4	Thinking Broadly: Scientific Inquiry[3]	4
HRP 101 (Local Beginnings)	3	Thinking Broadly: Humans & Their Societies	3
	13		**14**

Sophomore

First Term	Hours	Second Term	Hours	Summer Term	Hours
Academic Foundations: Reasoning	3	CH 237 & 237R & CH 238	4	BTR 412	3
BMD 203	3	City as a Classroom	3		
CH 235 & 235R & CH 236	4	Academic Foundations: Communication in the Modern World	3		
BY 124 & 124L	4	BMD 310	4		
		BMD 215	2		
	14		**16**		**3**

Junior

First Term	Hours	Second Term	Hours	Summer Term	Hours
Thinking Broadly: History & Meaning	3	Statistics	3	BT 451	3
Thinking Broadly: Creative Arts	3	BMD 317	4		
BMD 315	4	NTR 222	3		
BMD 320	3	Thinking Broadly (Options Available)[4]	3		
BT 470	3	BMD 300	2		
	16		**15**		**3**

Senior

First Term	Hours	Second Term	Hours
BMD 330	3	BMD 420	4
BMD 380	3	BMD 430	3
BMD 410	3	BMD 440	3
BMD 400	2	Minor Elective	3
Elective	3		
	14		**13**

Total credit hours: 121

1 MA 106 or higher is required
2 CH 115, CH 115R, and CH 116 is required
3 CH 117, CH 117R, and CH 118 is required
4 Select from one of the following Blazer Core options:
- History & Meaning
- Creative Arts
- Humans & Their Societies

Minor in Biotechnology

Requirements		Hours
BMD 215	Foundations of Biotechnology for Health Professions	2
BMD 300	Laboratory Techniques in Biotechnology I	2
BMD 400	Laboratory Techniques in Biotechnology II	2
BT 451	Principles of Biotechnology - Systems Biology and Pharmacology	3
BT 470	Bench to Commercialization Part 1	3
BTR 412	Integrated Topics in Biotechnology Regulatory Affairs	3
Electives		**3**
Please choose one of the options below:		
BT 450	Principles of Biotechnology - Amino Acid Technology	
BMD 478	Special Topics in Biomedical Sciences	
BMD 495	Practicum in Biomedical Sciences	
Total Hours		**18**

Minor in Biomedical Sciences

All courses (including prerequisites) must be completed with a grade of C or better and students must maintain a 2.75 overall GPA. Please contact BMD@uab.edu for more information on the BMD minor.

Requirements		Hours
Required Courses		
CH 115 & CH 116	General Chemistry I and General Chemistry I Laboratory	4
CH 117 & CH 118	General Chemistry II and General Chemistry II Laboratory	4
BY 123 & 123L	Introductory Biology I and Introductory Biology I Laboratory	4
BY 124 & 124L	Introductory Biology II and Introductory Biology II Laboratory	4
BMD 315	Clinical Physiology and Pharmacology for Health Professions I	4
BMD 317	Clinical Physiology and Pharmacology for Health Professions II	4
Choose 3-4 Semester Hours of BMD/CDS Elective Courses		**3-4**

BMD 310	Clinical Anatomy and Histology
BMD 320	Survey of Cell Biology for Health Professions
BMD 330	Clinical Microbiology for Health Professions
BMD 410	Clinical Biochemistry for Health Professions
BMD 420	Pathophysiology for Health Professions
BMD 430	Clinical Immunology for Health Professions
BMD 331	Microbiology Lab for Health Professions
Total Hours	**27-28**

Courses

BMD 150. Introduction to the Biomedical Sciences. 1 Hour.
Introduction to career paths within the Biomedical Sciences. Topics will address student needs and interests and current trends in the Biomedical Sciences. Emphasis will be placed on developing an individualized educational plan based on a student's academic and professional interests.

BMD 201. Contemporary Issues in Biomedical Sciences. 2 Hours.
A survey of current policy topics and industry trends in biomedical sciences, health, and medicine.

BMD 202. Survey of the Biomedical Sciences Literature. 1 Hour.
Techniques for searching, retrieving, reading, and analyzing the expert information used by biomedical researchers and health professions practitioners.

BMD 203. Contemporary Issues and the Literature in Biomedical Sciences. 3 Hours.
Synthesizing contemporary topics in biomedical sciences with techniques for searching, retrieving, reading, and analyzing expert information.

BMD 215. Foundations of Biotechnology for Health Professions. 2 Hours.
An introduction to the field of biotechnology, focusing on the intersection of science, regulation, and strategies of drug development in the health professions.
Prerequisites: BY 123 [Min Grade: C] and BY 124 [Min Grade: C] and BMD 203 [Min Grade: C]

BMD 300. Laboratory Techniques in Biotechnology I. 2 Hours.
Basic laboratory techniques in biotechnology utilizing a lab notebook, basic lab instruments, and making solutions. Basic molecular biology and mammalian cell culture techniques used in studying gene regulation.
Prerequisites: BMD 320 [Min Grade: C]

BMD 310. Clinical Anatomy and Histology. 4 Hours.
Exploration of the functional anatomy of the human body through gross and microscopic studies of cells, tissues, and organ systems; survey of body systems; correlations between the structures and functions of the body's various systems; association of major embryonic developmental events with functional gross anatomy.
Prerequisites: BY 124 [Min Grade: C](Can be taken Concurrently) and CH 235 [Min Grade: C](Can be taken Concurrently) or CH 245 [Min Grade: C](Can be taken Concurrently) and CH 236 [Min Grade: C](Can be taken Concurrently)

BMD 315. Clinical Physiology and Pharmacology for Health Professions I. 4 Hours.
Basic concepts of physiology and pharmacology related to human organ systems and drug categories; human physiological principles and their application to pharmacology; membrane physiology, muscle physiology, physiology of the autonomic nervous system and the cardiovascular system; application of physiologic principles to drug pharmacokinetic and pharmacodynamics models.
Prerequisites: (CH 115 [Min Grade: C] or CH 125 [Min Grade: C]) and (CH 116 [Min Grade: C] or CH 126 [Min Grade: C]) and (CH 117 [Min Grade: C] or CH 127 [Min Grade: C]) and (CH 118 [Min Grade: C] or CH 128 [Min Grade: C]) and BY 123 [Min Grade: C] and BY 124 [Min Grade: C] and (CH 235 [Min Grade: C] or CH 245 [Min Grade: C] and CH 236 [Min Grade: C]) and BMD 310 [Min Grade: C] and CH 237 [Min Grade: C](Can be taken Concurrently) or CH 247 [Min Grade: C] (Can be taken Concurrently) and CH 238 [Min Grade: C](Can be taken Concurrently)

BMD 317. Clinical Physiology and Pharmacology for Health Professions II. 4 Hours.
Basic concepts of physiology and pharmacology related to human organ systems and drug categories; human physiological principles and their application to pharmacology; renal, respiratory, gastrointestinal and endocrine systems; application of physiological principles to drug pharmacokinetic and pharmacodynamics models.
Prerequisites: BMD 315 [Min Grade: C]

BMD 320. Survey of Cell Biology for Health Professions. 3 Hours.
Molecular and cellular biosciences from a highly-integrated systems perspective; principles of eukaryotic cell structure and function, macromolecules, gene expression, signaling, division, differentiation, energy transformation and metabolism in cells; endocytosis, intramembrane transport, protein targeting, organelle biosynthesis, protein sorting, exocytosis, cell shape, motility, and cell-to-cell interaction; signal transduction processes and cellular functions required for cell growth and programmed cell death.
Prerequisites: (CH 115 [Min Grade: C] or CH 125 [Min Grade: C]) and (CH 116 [Min Grade: C] or CH 126 [Min Grade: C]) and (CH 117 [Min Grade: C] or CH 127 [Min Grade: C]) and (CH 118 [Min Grade: C] or CH 128 [Min Grade: C]) and BY 123 [Min Grade: C] and BY 124 [Min Grade: C](Can be taken Concurrently) and (CH 235 [Min Grade: C] or CH 245 [Min Grade: C] and CH 236 [Min Grade: C]) and CH 237 [Min Grade: C](Can be taken Concurrently) or CH 247 [Min Grade: C] (Can be taken Concurrently) and CH 238 [Min Grade: C](Can be taken Concurrently)

BMD 330. Clinical Microbiology for Health Professions. 3 Hours.
Clinically-based study of bacteriology, parasitology, mycology, and virology and the human host response to each; mechanisms of microbial pathogenicity and complex interactions with the host that produce symptoms of disease.
Prerequisites: (CH 115 [Min Grade: C] or CH 125 [Min Grade: C]) and (CH 116 [Min Grade: C] or CH 126 [Min Grade: C]) and (CH 117 [Min Grade: C] or CH 127 [Min Grade: C]) and (CH 118 [Min Grade: C] or CH 128 [Min Grade: C]) and BY 123 [Min Grade: C] and BY 124 [Min Grade: C] and BMD 320 [Min Grade: C]

BMD 331. Microbiology Lab for Health Professions. 1 Hour.
Practice of laboratory safety, correct operation of a compound light microscope, preparation and interpretation of various stains, cultivate, isolate and identify pathogenic microorganisms, and perform and interpret simple serologic assays.
Prerequisites: BMD 330 [Min Grade: C](Can be taken Concurrently)

BMD 345. Foundations of Patient Interaction. 3 Hours.
This course introduces undergraduate students to the humanistic, ethical, and practical dimensions of patient care. Combining classroom and laboratory instruction with interactive clinical case presentations, role-play, team simulations, and guest lectures, students will develop essential skills in bedside manner, taking patient history, medical ethics, and patient advocacy.
Prerequisites: BMD 317 [Min Grade: C]

BMD 380. Research Methods and Scientific Literacy for the Biomedical Sciences. 3 Hours.
Introduction to basic research methodology; review of statistical methods in health professions research. Emphasis will be given to preparing students to critically evaluate medical and scientific literature as well as web-based materials.
Prerequisites: BMD 203 [Min Grade: C] and MA 105 [Min Grade: C] (Can be taken Concurrently) or MA 106 [Min Grade: C](Can be taken Concurrently) or MA 107 [Min Grade: C](Can be taken Concurrently) or MA 125 [Min Grade: C](Can be taken Concurrently) or MA 168 [Min Grade: C](Can be taken Concurrently)

BMD 400. Laboratory Techniques in Biotechnology II. 2 Hours.
Laboratory techniques used in biotechnology, including cloning genes into an expression vector; transforming into E. coli; and transfection into mammalian cells for study of gene regulation and expression.
Prerequisites: BMD 300 [Min Grade: C]

BMD 410. Clinical Biochemistry for Health Professions. 3 Hours.
Current concepts of human biochemistry and molecular biology; protein structure and function, enzymes, intermediary metabolism, biosynthesis of lipids, and utilization of lipids; special emphasis on the molecular basis of inherited genetic diseases, acquired diseases, and clinically-related biochemistry.
Prerequisites: (CH 235 [Min Grade: C] or CH 245 [Min Grade: C]) and CH 236 [Min Grade: C] and (CH 237 [Min Grade: C] or CH 247 [Min Grade: C]) and CH 238 [Min Grade: C] and BMD 320 [Min Grade: C](Can be taken Concurrently)

BMD 420. Pathophysiology for Health Professions. 4 Hours.
Problem-oriented capstone study of general disease processes and the major subdivisions of general pathology: cellular adaptations, tissue injury and renewal, neoplasia, environmental and nutritional pathology, and pediatric disorders; cellular alterations and inflammation, genetic, immunological, nutritional and circulatory disorders; effects of infection, chemical and physical agents, blood and vascular diseases, neoplasia and aging as they apply to selected organ systems.
Prerequisites: BMD 317 [Min Grade: C] and BMD 380 [Min Grade: C]

BMD 430. Clinical Immunology for Health Professions. 3 Hours.
Basic immunology and the fundamental principles relating to the immune response in normal and disease states; antigens, antibodies, cells and structures of the immune system; process of immunity, allergies, transplantation and diseases; emphasis on the genetics, mechanisms, and regulation of the immune system in human health and disease.
Prerequisites: BMD 320 [Min Grade: C] and BMD 330 [Min Grade: C] (Can be taken Concurrently) and BMD 410 [Min Grade: C](Can be taken Concurrently)

BMD 440. Human Genetics for Health Professions. 3 Hours.
Upper level exploration of molecular basis and clinical presentations of human genetic disorders using a systems based approach; analysis relevant to clinical diagnosis and disease monitoring; ethical and moral issues associated with gathering and use of genetic information for non-medical activities; high level predictions of genetic evolution.
Prerequisites: BMD 320 [Min Grade: C](Can be taken Concurrently)

BMD 475. Capstone Experience in the Biomedical Sciences. 2-4 Hours.
Mentored capstone project to explore an area of student interest demonstrating curriculum integration. The capstone project should culminate in a formal scholarly work. Senior Standing required.
Prerequisites: BMD 315 [Min Grade: C] and BMD 317 [Min Grade: C] and BMD 320 [Min Grade: C]

BMD 478. Special Topics in Biomedical Sciences. 1-4 Hour.
Exploration of current issues in Biomedical Sciences.

BMD 490. Directed Readings in Biomedical Sciences. 1-3 Hour.
Directed readings and/or literature review under the direction of a faculty member. Approval of faculty sponsor and program director required.

BMD 495. Practicum in Biomedical Sciences. 1-6 Hour.
Course combines the practical workplace experience gained through an internship or service learning activity with a seminar component to guide reflective assessment of the total experience. Approval of faculty sponsor and program director required.

BMD 497. Directed Biomedical Sciences Research Studies. 1-6 Hour.
Students will conduct a field, laboratory, or literary study project culminating in a formal paper and/or presentation as directed by the supervising instructor. Approval of faculty sponsor and program director required.